Application No.: 10/541,700
Amendment dated: September 17, 2007
Reply to Office Action of March 16, 2007
Attorney Docket No.: 21295.0109US1

Amendments to the Specification

An Abstract of the disclosure is presented on a separate sheet in an attachment to this Amendment.

Please replace the Title of the Invention with the following amended paragraph:

Confocal 4-Pi Microscope and Method for ~~Confocal4-Pi~~ Confocal 4-Pi Microscopy

Please add the following three new paragraphs before paragraph [0001]:

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a national stage of PCT application serial number PCT/EP04/000029 filed on January 6, 2004, which claims priority to German application serial number DE 103001573 filed on January 7, 2003, both of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

Please replace paragraph [0004] with the following amended paragraph:

[0004] In confocal scanning microscopy specifically, an object is scanned in three dimensions with the focus of a light beam. In general, a confocal scanning microscope comprises a light source, a focusing optic with which the light from the light source is focused on a pinhole aperture--the so-called excitation aperture--, a beam splitter, a beam deflector to control the beam, a microscope optic, a detection aperture, and detectors to detect the detection and/or[[.]] fluorescent light. The illumination light is coupled by a beam splitter. The detection light emitted by the object, such as fluorescent or reflected

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light or even CARS light, returns to the beam splitter via the beam deflector, passes through it, and is finally focused on the detection aperture, behind which are located the detectors. Detection light that does not originate directly from the focus region takes another light path and does not pass through the detection aperture, so that one obtains point information that results in a three-dimensional image when the object is scanned sequentially. Most often, a three-dimensional image is achieved by taking layers of image data, in which case the path of the scanning beam ideally describes a meandering pattern on or in the object. (Scanning a line in x-direction at a constant y-position, then continuing x-scanning and by y-shifting to the next line to be scanned, scanning this line in a negative x-direction at a constant y-position, etc.). To enable layered data imaging, the sample table or the objective is shifted after scanning one layer so that the next layer to be scanned is brought into the focal plane of the objective.

Please add the following new paragraph before paragraph [0009]:

BRIEF SUMMARY OF THE INVENTION

Please replace paragraph [0025] with the following amended paragraph:

[0025] The sample is preferably marked with at least one luminescent dye, particularly with a fluorescent dye. In a preferred embodiment, the fluorescent dye is selected such that an illumination light wave to detection light wave ratio may be set in a range from 0.6 to 0.8, particularly in a range from 0.6 to 0.9, particularly at 0.75. To this end, with regard to the confocal ~~4-high~~ 4-pi microscope, at least one detection wavelength should be selectable, and the detector should be adjustable to the selected detection wavelength. In a variant, the detector is designed as a multi-band detector because this is particularly flexible and advantageously utilized with regard to the method according to the invention and with regard to the microscope according to the invention. It is also envisaged that a

minimum of one, preferably free illumination wavelength be selectable and that the light source be adjustable to the selected illumination wavelength.

Please replace paragraph [0028] with the following amended paragraph:

[0028] The efficiency trade-off when using a small section of the fluorescence spectrum is usually tolerable, particularly when one compares it to ~~two-photo~~ two-photon excitation according to the invention that is also possible, which has a lower output than confocal microscopy with single-photon excitation because of photobleaching. For multiple-photon excitation, the light source is preferably a pulse laser.

Please replace paragraph [0032] with the following amended paragraph:

[0032] In another variant, excitation of the sample comprises a ~~Foerster-resonant~~ Forster-resonant energy transfer (FRET) within the sample. Coupled dyes are used for this purpose, in which a high-energy excitable dye (the donor) gives off the excitation energy by means of resonant energy transfer to a dye of lesser energy (the acceptor), which then fluoresces strongly in the red-shifted range. The use of a dye chain that utilizes multiple coupling is also possible. ~~Foerster-resonant~~ Forster-resonant energy transfer (FRET) between two dye molecules is being used to determine spacing between these molecules in what are now widespread FRET experiments. In practice, transfer efficiencies approaching 100% are being achieved. In contrast to these experiments, permanent coupling is needed in the case of 4-pi. However, this is possible in principle, using an antibody that specifically bonds these two dye molecules.

Please add the following new paragraph before paragraph [0035]:

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Please add the following new paragraph before paragraph [0042]:

DETAILED DESCRIPTION OF THE INVENTION

Please delete the heading "REFERENCE LIST:" before paragraph [0049] and paragraphs [0049]-[0085] following this heading.

Please add the following new paragraph after paragraph [0085], before Claim 1:

CLAIMS

Attachment: Abstract of the disclosure